

**INFORMATION DISCLOSURE  
STATEMENT  
BY APPLICANT**

(Use several sheets if necessary)

Docket Number:  
AM-00102.P.1.1-US

Patent Number:  
10/072,975

Applicant:  
Efimov et al.

Filing Date:  
February 9, 2002

Group Art Unit:  
1651

**U.S. PATENT DOCUMENTS**

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUB- CLASS	FILING DATE IF APPROPRI ATE
	P1	5,432,272	7/11/95	Brenner			
	P2	5,508,178	4/16/96	Rose et al.			
	P3	5,539,082	7/23/96	Nielsen et al.			
	P4	5,641,625	6/24/97	Ecker et al.			
	P5	5,656,461	8/12/97	Demers			
	P6	5,714,331	2/3/98	Buchardt et al.			
	P7	5,719,262	2/17/98	Buchardt et al.			
	P8	5,736,336	4/7/98	Buchardt et al.			
	P9	5,766,855	6/16/98	Buchardt et al.			
	P10	5,773,571	6/30/98	Nielson et al.			
	P11	5,786,461	7/28/98	Buchardt et al.			
	P12	5,837,459	11/17/98	Berg et al.			
	P13	5,861,250	1/19/99	Stanley et al.			
	P14	5,864,010	1/26/99	Cook et al.			
	P15	5,874,553	2/23/99	Peyman et al.			
	P16	5,888,733	3/30/99	Hyldig-Nielson et al.			
	P17	5,932,711	8/3/99	Boles et al.			

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U.S. PATENT DOCUMENTS							
EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	C L A S S	SUB- CLASS	FILING DATE IF APPROPRIATE
	P18	5,972,610	10/26/99	Buchardt <i>et al.</i>			
	P19	5,977,296	11/2/99	Nielson <i>et al.</i>			
	P20	6,004,750	12/21/99	Frank-Kamenetski <i>et al.</i>			
	P21	6,015,887	1/18/00	Teng			
	P22	6,020,124	2/1/00	Sorenson			
	P23	6,020,126	2/1/00	Carlsson <i>et al.</i>			
	P24	6,025,140	2/15/00	Langel <i>et al.</i>			
	P25	6,025,482	2/15/00	Cook <i>et al.</i>			
	P26	6,045,995	4/4/00	Cummins <i>et al.</i>			
	P27	6,060,242	5/9/00	Nielson <i>et al.</i>			
	P28	6,063,571	5/16/00	Uhlmann <i>et al.</i>			
	P29	6,107,470	8/22/00	Nielson <i>et al.</i>			
	P30	6,110,676	8/26/00	Coull <i>et al.</i>			
	P31	6,110,678	8/29/00	Weisburg <i>et al.</i>			
	P32	6,150,510	11/21/00	Seela <i>et al.</i>			
	P33	6,165,720	12/26/00	Felgner <i>et al.</i>			
	P34	6,180,770	1/30/01	Boles <i>et al.</i>			

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	P1	5,760,201	6/2/98	Glazer et al.			
	P2	5,783,687	7/21/98	Glazer et al.			
	P3	6,054,272	4/25/00	Glazer et al.			
	P4	6,180,767	1/30/01	Wickstrom et al.			
	P5	6,232,066	5/15/01	Felder et al.			
	P6	6,280,946	8/28/01	Hyldig-Nielsen et al.			
	P7	6,312,956	11/6/01	Lane			
	P8	6,326,479	12/4/01	Gildea et al.			

**FOREIGN PATENT DOCUMENTS**

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB- CLASS	Translation	
							YES	NO
	F1	WO 99/60156	11/25/99					
	F2	WO 00/34521	6/15/00					
	F3	WO 01/01144	1/4/01					
	F4	WO 01/38565	5/31/01					
	F5	WO 01/68673	9/20/01					

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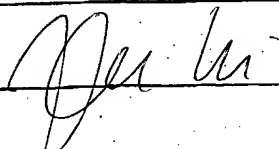
FOREIGN PATENT DOCUMENTS								
EXAMINER INITIAL		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB- CLASS	Translation	
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<i>N</i>	F1	WO 92/002258	2/20/92					
<i>N</i>	F2	WO 92/20702	11/26/92					
<i>N</i>	F3	WO 93/10820	6/10/93					
<i>N</i>	F4	WO 94/22892	10/13/94					
<i>N</i>	F5	WO 94/24144	10/27/94					
<i>N</i>	F6	WO 99/14266	3/25/99					
<i>N</i>	F7	WO 00/56746	9/28/00					
<i>N</i>	F8	WO 00/56748	9/28/00					
<i>N</i>	F9	WO 00/56916	9/28/00					
<i>N</i>	F10	WO 00/56920	9/28/00					

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OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)		
EXAMINER INITIALS		CITATION
<i>M</i>	D1	Adams et al., J. Am. Chem. Soc. 105:661-663 (1983)
<i>M</i>	<del>D2</del>	<del>Ausubel et al., Current Protocols in Molecular Biology, John Wiley and Sons (1998)</del>
<i>M</i>	D3	Beaucage and Caruthers, Tetrahedron Lett. 22:1859-1862 (1981)
<i>M</i>	D4	Briepohl et al., Bioorg. & Med. Chem. Lett. 6:665 (1996)
<i>M</i>	D5	Buchardt et al., PNAs and their Potential Applications in Biotechnology, Tibtech 11: 384-386 (1993)
<i>M</i>	D6	Chandler et al., Affinity Capture and Recovery of DNA at Femtomolar Concentrations with PNA Probes, Analytical Biochemistry 283: 241-249 (2000)
<i>M</i>	D7	Chow et al., Nucl. Acids Res 9:2807-2817 (1981)
<i>M</i>	D8	Cochet et al., Selective PCR Amplification of Functional Immunoglobulin Light Chain from Hybridoma Containing the Aberrant MOPC 21-Derived V $\kappa$ by PNA-Mediated PCR Clamping, Biotechniques 26: 818-822 (1999)
<i>M</i>	D9	Coste et al., Tetrahedron Lett. 31:669-672 (1990)
<i>M</i>	D10	Crea and Horn, Nucl. Acids Res. 8:2331-2348 (1980)
<i>M</i>	D11	Domling et al., A Novel Method to Highly Versatile Monomeric PNA Building Blocks by Multi Component Reactions, Bioorganic & Medicinal Chemistry Letters 9: 2871-2874 (1999)
<i>M</i>	D12	Efimov et al., Nucl. Acids Res 11:8369-8387 (1983)
<i>M</i>	D13	Efimov et al., Nucl. Acids Res. 13:3651-3666 (1985)
<i>M</i>	D14	Efimov et al., Application of new catalytic phosphate protecting groups for the highly efficient phosphotriester oligonucleotide synthesis, Nucl. Acids Res. 14:6525-6540 (1986)
<i>M</i>	D15	Efimov et al., Abstracts of Protein Engineering Symposium, Groningen, May 4-7, 1986, Groningen, The Netherlands, Drenth, ed. p.9 (1986)
<i>M</i>	D16	Efimov et al., Collect. Czech. Chem. Commun. 61:S262-S264 (1996)

Examiner Signature	<i>[Signature]</i>	Date Considered	11/3/04
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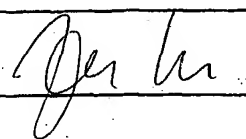
OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)		
EXAMINER INITIALS		CITATION
M	D17	Efimov et al., Bioorg. Khim. 24:696-709(1998) <i>abstract only in English-</i>
M	D18	Efimov et al., Synthesis and evaluatin of some properties of chimeric oligomers containing PNA and phophono-PNA residues, <i>Nucl. Acids Res.</i> 26:566-575 (1998)
M	D19	Efimov et al., Synthesis of polyacrylamides N-substituted with PNA-like oligonucleotide mimics for molecular diagnostic applications, <i>Nucl. Acids Res.</i> 27:4416-4426 (1999)
M	D20	Efimov et al., Peptide Nucleic Acids and Their Phosphonate Analogues: II. Synthesis and Physiochemical Properties of Hybrids Containing Serine and 4-Hydroxyproline Residues, <i>Russian Journal of Bioorganic Chemistry</i> 25:545-555 (1999)
M	D21	Efimov et al., Polyacrylamide Conjugates with Oligonucleotides and Their Mimics for Diagnostics, <i>Russian Journal of Bioorganic Chemistry</i> 25:752-758 (1999)
M	D22	Efimov et al., Phosponate Analogues of Peptide Nucleic Acids and Related Compounds: Synthesis and Hybridization Properties, <i>Nucleosides &amp; Nucleotides</i> 18:1393-1396 (1999)
M	D23	Efimov et al., Novel Oligonucleotide Analogues Derived from Serine and 4-Hydroxyproline, <i>Nucleosides &amp; Nucleotides</i> 18(6&7): 1425-1426 (1999)
M	D24	Efimov et al., Polyester and N-Methyl Analogues of Peptide Nucleic Acids: Synthesis and Hybridization Properties, <i>Nucleosides &amp; Nucleotides</i> 18(11&12): 2533-2549 (1999)
M	D25	Efimov and Chakhmakhcheva, Solid Phase Synthesis of PNA-Like Oligonucleotide Mimics and their Use for Polyacrylamide-Based Molecular Diagnostic Assays, Shemyakin & Ovchinnikov Institute of Bioorganic Chemistry, 10 pgs.
M	D26	Egholm et al., Peptide Nucleic Acids Oligonucleotide Analogues with an Achiral Backbone, <i>J. Am. Chem. Soc.</i> 114: 1895-1897 (1992)
M	D27	Egholm et al., Recognition of Guanine and Adenine in DNA by Cytosine and Thymine Containing Peptide Nucleic Acids (PNA), <i>J. Am. Chem. Soc.</i> 114: 9677-9678 (1992)
M	D28	Egholm et al., PNA Hybridizes to Complimentary Oligonucleotides Obeying the Watson-Crick Hydrogen-Bonding Rules, <i>Nature</i> 365: 566-568 (1993)

Examiner Signature		Date Considered	11/3/04
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# OTHER DOCUMENTS

(Including Author, Title, Date, Pertinent Pages, Etc.)

EXAMINER INITIALS		CITATION
CH	D29	Falkiewicz et al., Synthesis and Characterization of New PNA Monomers, Nucleic Acids Symposium Series 42: 29-30 (1999)
W	D30	Fahrlander and Klausner, Amplifying DNA Probe Signals: A 'Christmas Tree' Approach, Biotechnology 6: 1165-1168 (1988)
W	D31	Finn et al., Nucl. Acids Res. 24:3357-3364 (1996)
W	D32	Froehler et al., J. Am. Chem. Soc. 107:278-279 (1985)
W	D33	Gait et al., Nucl. Acids Res. 8:1081-1096 (1980)
W	D34	Gait et al. Nucl. Acids Res. 10:6243-6254 (1982)
W	D35	Gao et al., Tetrahedron Lett. 32:5477-5480 (1991)
W	D36	Goodchild, J. Bioconjugate Chem. 1:165 (1990)
W	D37	Hanvey et al., Antisense and Antigene Properties of PNAs, Science 258: 1481-1485 (1992)
<del>W</del>	<del>D38</del>	<del>Harlowe and Lane, Antibodies, a Laboratory Manual, Cold Spring Harbor Press (1988)</del>
W	D39	Heinklein et al., in Girault and Andreu (eds.) The Peptides, 21 <sup>st</sup> European Peptide Symposium, ESCOM, Leiden pp. 67-77
W	D40	Igloi, Automated Detection of Point Mutations by Electrophoresis in PNA-containing Gels, BioTechniques 27: 798-808 (1999)
W	D41	Ishihara and Corey, Strand Invasion by DNA-Peptide Conjugates and Peptide Nucleic Acids, Nucleic Acids Symposium Series 42: 141-142 (1999)
W	D42	Izvolksky et al., Sequence-Specific Protection of Duplex DNA against Restriction and Methylation Enzymes by Pseudocomplementary PNAs, Biochemistry 39: 10908-10913 (2000)

Examiner Signature		Date Considered	11/3/04
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OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)		
EXAMINER INITIALS		CITATION
	D43	Kenney et al., Mutation Typing Using Electrophoresis and Gel-Immobilized Acrydite Probes, Biotechniques 25: 516-521 (1998)
	D44	Knudsen and Nielsen, Antisense Properties of Duplex- and Triplex-Forming PNAs, Nucl. Acids Res. 24(3): 494-500 (1996)
	D45	Koster et al., Tetrahedron Lett. 24:747-750 (1983)
	D46	Koysynkina et al., Tetrahedron Lett. 35:5173-5176 (1994)
	D47	Kuwahara et al., Synthesis of Oxy-Peptide Nucleic Acids with Mixed Sequences, Nucleic Acids Symposium Series 42: 31-32 (1999)
	D48	Lohse et al., Double Duplex Invasion by Peptide Nucleic Acid: A General Principle for Sequence-Specific Targeting of Double-Stranded DNA, Proc. Natl. Acad. Sci. 96(21): 11804-11808 (1999)
	D49	Mayfield and Corey, Automated Synthesis of Peptide Nucleic Acids and Peptide Nucleic Acid-Peptide Conjugates, Analytical Biochemistry 268: 401-404 (1999)
	D50	McCollum and Andrus, Tetrahedron Lett. 32:4069-4072 (1991)
	D51	Mollegaard et al., PNA/DNA Strand Displacement Loops as Artificial Transcription Promoters, Proc. Natl. Acad. Sci. 91: 3892-3895 (1994)
	D52	Nielsen et al., Sequence-Selective Recognition of DNA by Strand Displacement with a Thymine-Substituted Polyamide, Science 254: 1497-1500 (1991)
	D53	Nielsen, Applications of Peptide Nucleic Acids, Current Opinion in Biotechnology 10:71-75 (1999)
	D54	Nielsen, Antisense Properties of Peptide Nucleic Acid, Methods in Enzymology 313: 156-164 (1999)
	D55	Orum et al., Nucl. Acids Res. 21:5332-5336 (1993)
	D56	Orum et al., Sequence-Specific Purification of Nucleic Acids by PNA-Controlled Hybrid Selection, Biotechniques 19(3): 472-480 (1995)
	D57	Pain et al., Cells Tissues Organs 165:212-219 (1999)
	D58	Proudnikov et al., Immobilization of DNA in PolyAcrylamide Gel for the Manufacture of DNA and DNA-Oligonucleotide Microchips, Analytical Biochemistry 259: 34-41 (1998)

Examiner Signature		Date Considered	4/3/04
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OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)		
EXAMINER INITIALS		CITATION
<i>M</i>	D59	Rehman et al., Immobilization of Acrylamide-modified Oligonucleotides by Co-Polymerization, Nucl. Acids Res. 27(2): 649-655 (1999)
	<del>D60</del>	<del>Sambrook et al., Molecular Cloning: A Laboratory Manual, 2<sup>nd</sup> edition, Cold Spring Harbor Press, Cold Spring Harbor, N.Y. (1989)</del>
	<del>D61</del>	<del>Sandler and Karo, Polymer Synthesis Vol. 1, Academic Press (1992)</del>
	<del>D62</del>	<del>Sandler and Karo, Polymer Synthesis Vol. 2, Academic Press (1994)</del>
<i>M</i>	D63	Sproat et al., Nucl. Acids Res. 14:1811-1824 (1986)
<i>M</i>	D64	Sugimoto et al., Comparison of Thermodynamic Stabilities between PNA/DNA Hybrid Duplexes and DNA/DNA Duplexes, Nucleic Acids Symposium Series 42: 93-94 (1999)
<i>M</i>	D65	Sugimoto et al., Positional Effect of Single Bulge Nucleotide on PNA/DNA Hybrid Stability, Nucleic Acids Symposium Series 42: 95-96 (1999)
<i>M</i>	D66	Takeuchi et al., Chem. Pharm. Bull. 22:832-840 (1974)
<i>M</i>	D67	van der Laan et al., An Approach Towards the Synthesis of Oligomers Containing a N-2-Hydroxyethyl-aminomethylphosphonate Backbone: A Novel PNA Analogue, Tetrahedron Lett. 37:7857-7860 (1996)
<i>M</i>	D68	von Wintzingerode et al., PNA-Mediated PCR Clamping as a Useful Supplement in the Determination of Microbial Diversity, Applied and Env. Microbiology 66(2): 549-557 (2000)
<i>M</i>	D69	Wang et al., PNA Binding-Mediated Induction of Human $\gamma$ -globin Gene Expression, Nucl. Acids. Res. 27(13): 2806-2813 (1999)
<i>M</i>	D70	Will et al., The Synthesis of Polyamide Nucleic Acids using a Novel Monomethoxytrityl Protecting-Group Strategy, Tetrahedron Lett. 51:12069-12082 (1995)
<i>M</i>	D71	Zhong et al., Detection of Apolipoprotein B mRNA Editing by PNA mediated PCR Clamping, Biochem. and Biophys. Res. Comm. 259: 311-313 (1999)
<i>M</i>	D72	Advertisement for 'mVader', Biotechniques 28 (4): (2000)

Examiner Signature	<i>[Signature]</i>	Date Considered	11/31/04
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OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)		
EXAMINER INITIALS		CITATION
	D1	Bergmann <i>et al.</i> , Solid Phase Synthesis of Directly Linked PNA-DNA-Hybrids, <i>Tetrahedron Letters</i> 36: 6823-6826 (1995).
	D2	De Backer <i>et al.</i> , An antisense-based functional genomics approach for identification of genes critical for growth of <i>Candida albicans</i> , <i>Nat. Biotechnol.</i> 19: 235-41 (2001).
	D3	Efimov <i>et al.</i> , PNA-Related Oligonucleotide Mimics and their Evaluation for Nucleic Acid Hybridization Studies and Analysis, <i>Nucleosides, Nucleotides &amp; Nucleic Acids</i> 20(4-7), 419-428 (2001).
	D4	Eriksson <i>et al.</i> , Cell Permeabilization and Uptake of Antisense Peptide-Peptide Nucleic Acid (PNA) into <i>Escherichia coli</i> , <i>J. Biol. Chem.</i> 277: 7144-7147 (2002).
	D5	Good <i>et al.</i> , Antisense inhibition of gene expression in bacteria by PNA targeted to mRNA, <i>Nat. Biotechnol.</i> 16: 355-358 (1998).
	D6	Good <i>et al.</i> , Antisense PNA effects in <i>Escherichia coli</i> are limited by the outer-membranes LPS layer, <i>Microbiology</i> 146: 2665-2670 (2000).
	D7	Nasevicius <i>et al.</i> , Effective targeted gene 'knockdown' in zebrafish, <i>Nat. Genet.</i> 26: 216-220 (2000).
	D8	Phelan <i>et al.</i> , Messenger RNA Isolation Using Novel PNA Analogues, <i>Nucleosides, Nucleotides &amp; Nucleic Acids</i> 20(4-7): 1107-1111 (2001).
	D9	Rye <i>et al.</i> , stable fluorescent complexes of double-stranded DNA with bis-intercalating asymmetric cyanine dyes: properties and applications, <i>Nucl. Acids Res.</i> 20: 2803-2812 (1992).
	D10	Sazani <i>et al.</i> , Detection of tumor mutations in the presences of excess amounts of normal DNA, <i>Nat. Biotechnol.</i> 19: 186-189 (2001).
	D11	Sun <i>et al.</i> , Detection of tumor mutations in the presence of excess amounts of normal DNA, <i>Nat. Biotechnol.</i> 19: 186-189 (2002).
	D12	Tomac <i>et al.</i> , Ionic Effects on the Stability and Conformation of Peptide Nucleic Acid Complexes, <i>J. Am. Chem. Soc.</i> 118: 5544-5552 (1996).
	D13	Weiler <i>et al.</i> , Hybridisation based DNA screening on peptide nucleic acid (PNA) oligomer arrays, <i>Nucl. Acids Res.</i> 25: 2793-2799 (1997).
	D14	Wittung <i>et al.</i> , Interactions of DNA binding ligands with PNA - DNA hybrids, <i>Nucl. Acids. Res.</i> 22: 5371-5377 (1994).
	D15	<a href="http://www.activemotif.com/products/mol/">www.activemotif.com/products/mol/</a> , January 31, 2002.
	D16	advertisements, <i>Science</i> 296: 1780 (June 2002).

Examiner Signature		Date Considered	11/3/04
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							YES	NO
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OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)		
EXAMINER INITIALS		CITATION
	D1	Efimov et al., Russian Journal of Bioorganic Chemistry 24(9) 618-630 (1998) (Translated from Bioorganicheskaya Khimiya 24(9):696-709 (1998))
	D2	Efimov et al., Bioorganicheskaya Khimiya 24(9):696-709 (1998).

Examiner Signature	<i>[Signature]</i>	Date Considered	11/3/04
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